

CLAIMS

- 1 1. An illuminator for illuminating a subject that is imaged by an image sensor com-
2 prising:
3 a first ring light source arranged in a perimeter of a predetermined shape commu-
4 nicating with a first light pipe having a cross-section with the predetermined shape, the
5 first light pipe defining an inner lumen through which the sensor views the subject and
6 the light pipe including a tip adapted to project a low-angle dark field illumination pattern
7 on the subject; and
8 a controller that selectively controls predetermined portions of the first ring light
9 source to project a variable light around the perimeter.
- 1 2. The illuminator as set forth in claim 1 further comprising a second ring light
2 source communicating with a second light pipe, the first light pipe being coaxial with re-
3 spect to the second light pipe, the second light pipe having a tip adapted to project a high-
4 angle bright field illumination pattern with respect to the subject.
- 1 3. The illuminator as set forth in claim 1 wherein the predetermined shape defines a
2 circle.
- 1 4. The illuminator as set forth in claim 1 wherein the predetermined shape defines a
2 rectangle.
- 1 5. The illuminator as set forth in claim 1 wherein the perimeter of the predetermined
2 shape defines a shape that reduces a field of view of the image sensor.
- 1 6. The illuminator as set forth in claim 1 wherein the predetermined shape defines a
2 curved shape.

1 7. The illuminator as set forth in claim 1 wherein the predetermined shape defines a
2 shape conforming to dimensions of a predetermined subject.

1 8. The illuminator as set forth in claim 1 wherein the first light pipe and the first ring
2 light source are each mounted on a handheld scanning appliance.

1 9. The illuminator as set forth in claim 1 further comprising a set of light sources
2 that each project a beam at a predetermined point with respect to the subject to thereby
3 assist aiming of the image sensor at the subject.

1 10. The illuminator as set forth in claim 1 further comprising a set of light sources
2 that each project a beam at a predetermined point with respect to the subject to thereby
3 assist aiming of the image sensor at the subject.

1 11. An illuminator for illuminating a subject that is imaged by an image sensor com-
2 prising:

3 a first ring light source arranged in a perimeter of a predetermined shape commu-
4 nicating with a first light pipe having a cross-section with the predetermined shape, the
5 first light pipe defining an inner lumen through which the sensor views the subject and
6 the light pipe including a tip adapted to project a low-angle dark field illumination pattern
7 on the subject; and

8 a second ring light source coaxial with respect to the first ring light source and
9 communicating with a second light pipe coaxial with the first light pipe, the first light
10 pipe having a tip adapted to project a high-angle bright field illumination pattern with re-
11 spect to the subject.

1 12. An illuminator as set forth in claim 11 further comprising a controller that selec-
2 tively controls predetermined portions of the first ring light source to project a variable
3 light around the perimeter.

1 13. The illuminator as set forth in claim 11 wherein predetermined shape defines a
2 circle.

1 14. The illuminator as set forth in claim 11 wherein predetermined shape defines a
2 rectangle.

1 15. The illuminator as set forth in claim 11 wherein the perimeter of the predeter-
2 mined shape defines a shape that reduces a field of view of the image sensor.

1 16. The illuminator as set forth in claim 11 wherein the predetermined shape defines a
2 curved shape.

1 17. The illuminator as set forth in claim 11 wherein the predetermined shape defines a
2 shape conforming to dimensions of a predetermined subject.

1 18. The illuminator as set forth in claim 11 wherein the first light pipe and the first
2 ring light source and the second light pipe and the second ring light source are each
3 mounted on a handheld scanning appliance.

1 19. The illuminator as set forth in claim 11 further comprising a set of light sources
2 that each project a beam at a predetermined point with respect to the subject to thereby
3 assist aiming of the image sensor at the subject.

1 20. The illuminator as set forth in claim 11 wherein each of the first light pipe and the
2 second light pipe are mounted together with a securing ring sized and arranged to secure
3 to a camera assembly.

1 21. The illuminator as set forth in claim 20 wherein the mounting ring is constructed
2 and arranged to removably secure the first light pipe and the second light pipe to the
3 camera assembly.

1 22. The illuminator as set forth in claim 11 wherein the second ring is nested within
2 the first ring and wherein the tip of the second ring is recessed with respect to the tip of
3 the first ring so as to provide an area in an inner wall of the first ring adjacent to the tip of
4 the first ring for projection of the low-angle dark field illumination pattern therefrom.

1 23. An illuminator for illuminating a subject that is imaged by an image sensor com-
2 prising:

3 a ring light source arranged in a perimeter of a predetermined shape communi-
4 cating with a light pipe having a cross-section with the predetermined shape, the light
5 pipe defining an inner lumen through which the sensor views the subject and the light
6 pipe including a tip adapted to project a high-angle bright field illumination pattern with
7 respect to the subject.

1 24. The illuminator as set forth in claim 23 wherein predetermined shape defines a
2 circle.

1 25. The illuminator as set forth in claim 23 wherein predetermined shape defines a
2 rectangle.

1 26. The illuminator as set forth in claim 23 wherein the perimeter of the predeter-
2 mined shape defines a shape that reduces a field of view of the image sensor.

1 27. The illuminator as set forth in claim 23 wherein the predetermined shape defines a
2 shape conforming to dimensions of a predetermined subject.

1 28. The illuminator as set forth in claim 23 wherein the light pipe and the ring light
2 source are each mounted on a handheld scanning appliance.

1 29. The illuminator as set forth in claim 23 further comprising a set of light sources
2 that each project a beam at a predetermined point with respect to the subject to thereby
3 assist aiming of the image sensor at the subject.

1 30. An illuminator for illuminating a subject that is imaged by an image sensor hav-
2 ing a field of view comprising:

3 a ring light source arranged in a perimeter of a predetermined shape communi-
4 cating with a light pipe having a cross-section with the predetermined shape, the light
5 pipe defining an inner lumen through which the sensor views the subject and the light
6 pipe including a tip adapted to project an illumination pattern with respect to the subject;
7 and

8 wherein the illumination pattern covers a reduced area with respect to the field of
9 view whereby an aiming location is highlighted by the illumination pattern.

1 31. The illuminator as set forth in claim 30 wherein the light pipe includes a tip
2 adapted to project a high-angle bright field illumination.

1 32. The illuminator as set forth in claim 30 wherein the light pipe includes a tip
2 adapted to project a low-angle dark field illumination.

1 33. The illuminator as set forth in claim 30 wherein the light pipe is mounted on a
2 handheld scanning appliance.

1 34. An illuminator for illuminating a subject that is imaged by an image sensor com-
2 prising:

3 a first ring light source arranged in a perimeter of a predetermined shape commu-
4 nicating with a first light pipe having a cross-section with the predetermined shape, the
5 first light pipe defining an inner lumen through which the sensor views the subject and
6 the light pipe including a tip adapted to project a low-angle dark field illumination pattern
7 on the subject; and

8 a bright field illuminator located external to the light pipe.

1 35. The illuminator as set forth in claim 34 wherein the bright field illuminator com-
2 prises a ring coaxial with the light pipe.